

OPERATING SUMMARY

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MOOSONEE

WATER SUPPLY SYSTEM and
WATER POLLUTION CONTROL PLANT

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MINISTRY OF THE
ENVIRONMENT

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MOOSONEE
WATER SUPPLY SYSTEM
and
WATER POLLUTION CONTROL PLANT

MINISTRY OF THE ENVIRONMENT

1974 ANNUAL OPERATING SUMMARY

prepared by
Plant Performance Unit
TECHNICAL SERVICES BRANCH
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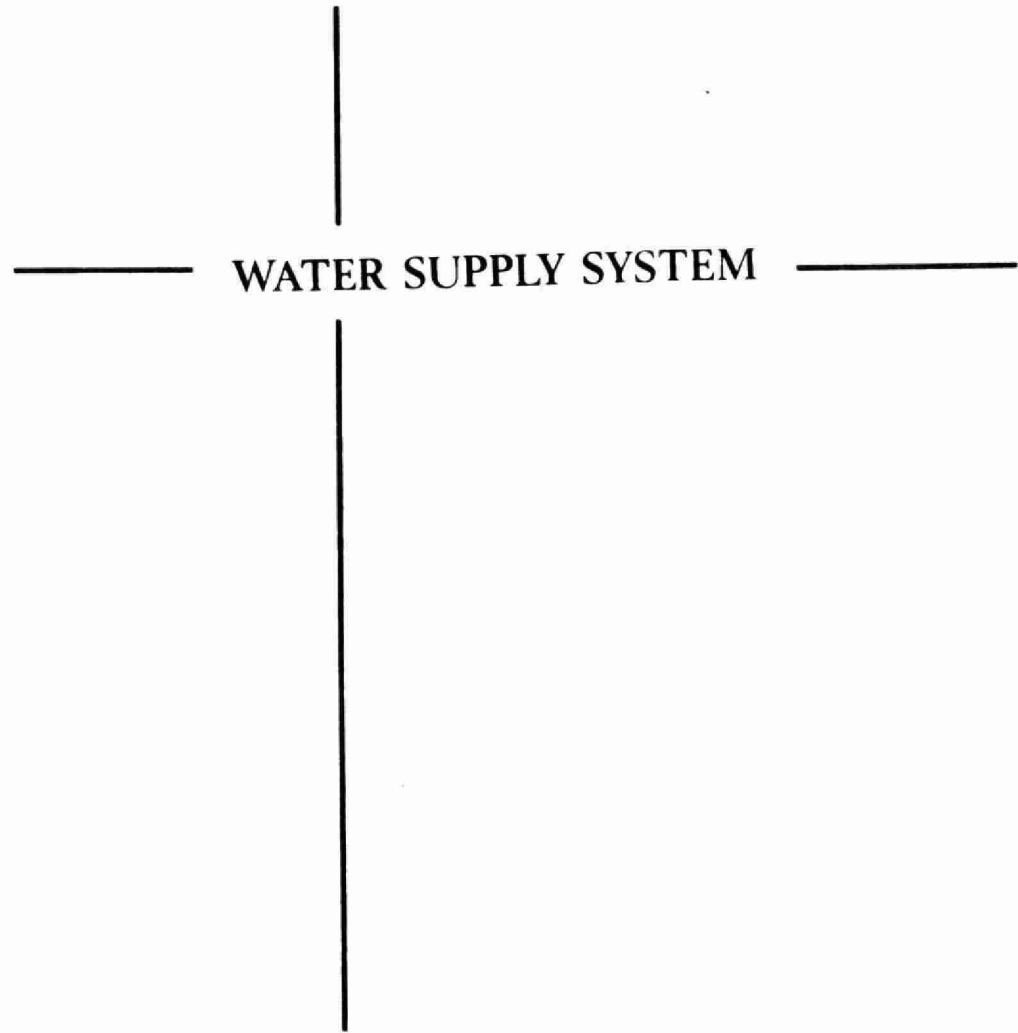
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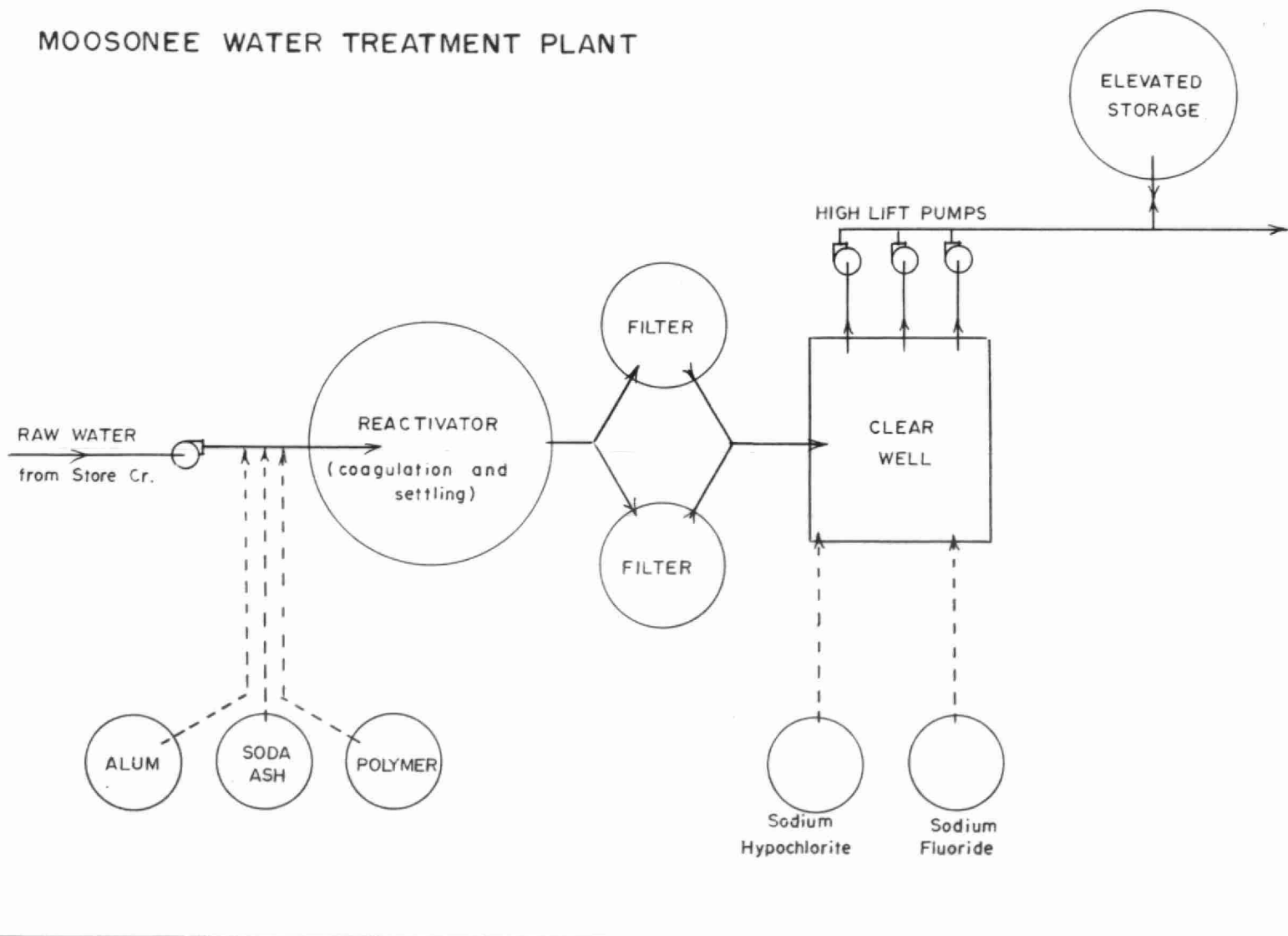
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MOOSONEE WATER TREATMENT PLANT



DESIGN DATA

PROJECT NO. 5-0004-66
PROJECT NAME Moosonee Water Treatment Plant
NOMINAL CAPACITY 150,000 IGPD

RAW SOURCE Store Creek

INTAKE

Steel plate guard cage
1" Steel pipe spacers
Pipe 36' of 8" dia. to raw water well

LOW LIFT PUMPS

2 (in raw water well)
Type: Pleuger
Rate: 145 IGPM @ 72' head

FILTRATION

Type: 2 monovalve filter units -
Graver 2 compartment
Size: Ht. 10'6", dia. 6'
Rate: 1.9 gpm/sq. ft. 53 gpm per filter
Backwash: Adjustable: 170 igpm
12 igpm/sq. ft.

REACTIVATOR - One

Type: Graver, 3 stage (mixing, flocculation & sedimentation)
Size: 14' dia.
Rise Rate: 1.0 gal/sq. ft. rise area
Detention Time: 114 min.
Including: variable speed recirculator
positive sludge scraper

HIGH LIFT PUMPS - 3 (in plant building)
Type: Layne & Bowler, 3 stage
Rate: 150 US gpm @ 150' TDH Layne

CHLORINATION

Type: One Wallace & Tiernan V-notch dual head pump
Rate: 30 ppm (12% Sodium hypochlorite)
Tank Size: 30" x 4.0' - 115 gal.

CHEMICAL FEED EQUIPMENT for

Alum, soda ash & coagulant aid (separan NP10)
a) one neptune 3" crest meter
b) feed tanks - 2 42' dia x 4'0" (soda ash & alum)
1 30" dia x 4'0" (separan)
c) 6 $\frac{1}{4}$ h.p. agitators
d) pumps: one W&T single head, separan
two W&T dual head, alum

FLUORIDATION

Type: BIF chemo-feeder
Rate: 1 ppm Hydrofluorosilic acid @ 25%

STORAGE:

Town elevated tank: 50,000 gal
Clear Water Well: 55,000 gal
Raw Water Well: 72' dia - same level as creek

SCREENING

Type: Stationary
Size: $\frac{1}{4}$ " holes, 4' x 4'

'74 Review

GENERAL

The Moosonee Water Treatment Plant has a design flow capacity of 150 thousand gallons per day. Treatment consists of coarse screening, flocculation, sedimentation, sand filtration and chlorination. Raw water is taken from Store Creek.

The project is operated by a chief operator and one operator who divide their duties between the water treatment plant and the sewage treatment plant.

The high water demand placed on the water treatment plant due to watermain breaks and running of taps to prevent service line freezing was discussed with representatives from the Ministry of Treasury, Economics and Intergovernmental Affairs, and they have engaged a consulting engineering firm to prepare a report on the water system problems which should be completed early in 1975. One of the preliminary recommendations received from the consultant was to provide 10 feet of ground cover on all watermains and services.

In December of the year, a major leak occurred in the middle of Store Creek where the watermain crosses under the creek. The Moosonee Development Area Board works crew effected repairs and the service to people on the south side of the creek was only temporarily disrupted.

The serviced population did not change from the 1973 total of approximately 1,125. The per capita flow averaged 134 gallons per day in 1974.

OPERATING COSTS

The total operating cost for the year was \$34,906 which represents an increase of 25% over the previous year.

The average cost per million gallons of water treated was \$632 which is 3% less than the cost in 1973.

PLANT FLOWS

The average daily flow during the year was 151 thousand gallons and is 26% greater than the average daily flow in 1973. The maximum daily demand occurred in April and amounted to 316 thousand gallons. Blending of raw water with treated water was necessary at various times during the first six months of the year.

CHEMICAL TREATMENT

The average chemical dosages during the year were 80.4 mg/l alum; 1.1 mg/l Seperan; 53.3 mg/l soda ash; 1.8 mg/l fluosilicic acid as fluoride; and 3.6 mg/l sodium hypochlorite as chlorine. The coagulant chemical was changed from Seperan to Purifloc A-22 in December because there was substantial cost saving to be realized using the polyelectrolyte. The Purifloc A-22 is used at a dosage of 1.0 mg/l.

The average fluoride concentration and chlorine residual in the treated water were 1.0 mg/l and 0.6 mg/l respectively.

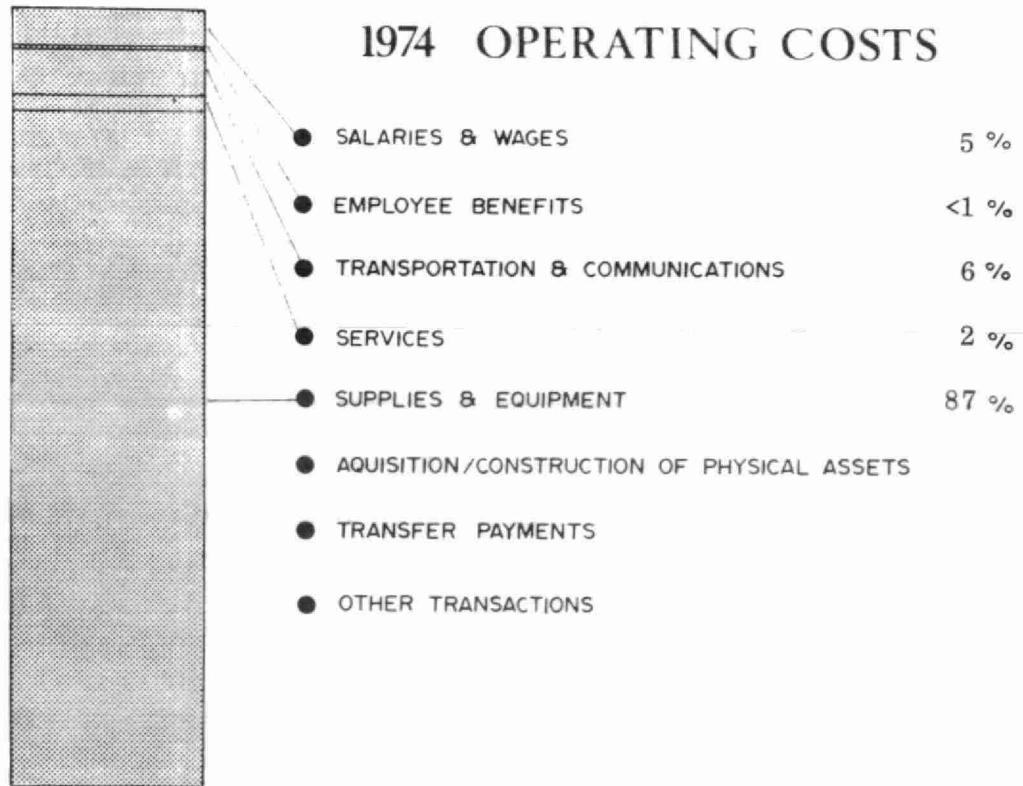
The average treated water concentrations of iron at 0.15 mg/l, chloride at 117 mg/l and pH at 7.8 were within Ministry requirements. The average turbidity of 4.8 JTU and colour of 17 apparent units exceeded Ministry requirements mainly because of the necessity to blend raw water and treated water at various times during the year.

CONCLUSIONS

The plant produced a substandard treated water during part of the year due to water distribution problems. An engineering report to provide solutions to correct these problems will be completed in 1975.

ANNUAL COSTS

1974 OPERATING COSTS



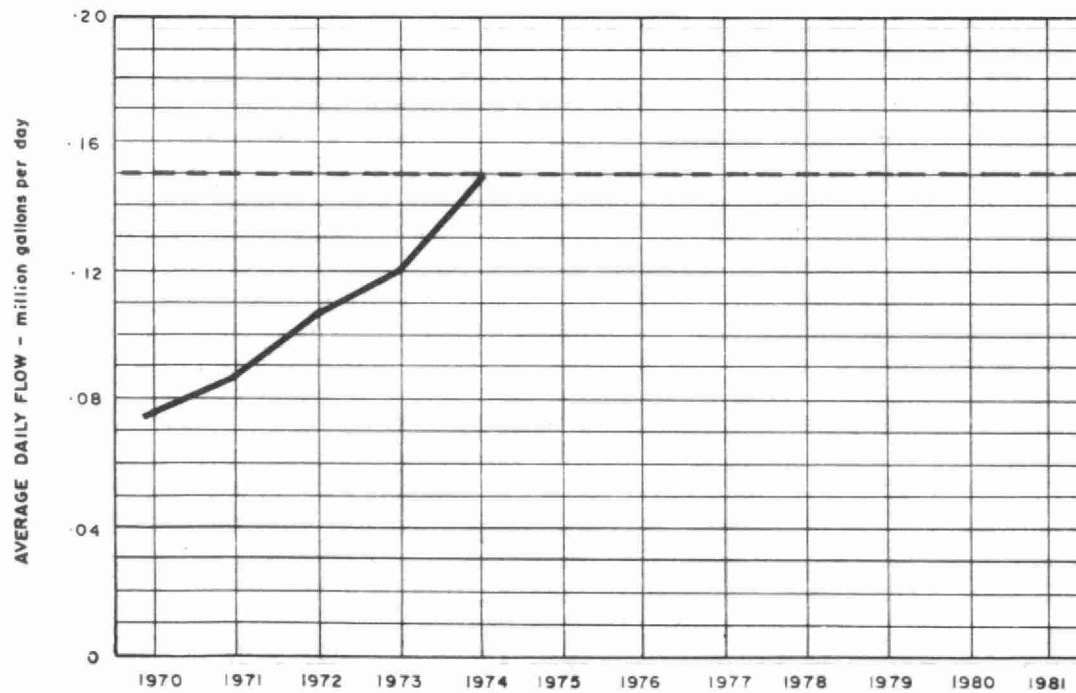
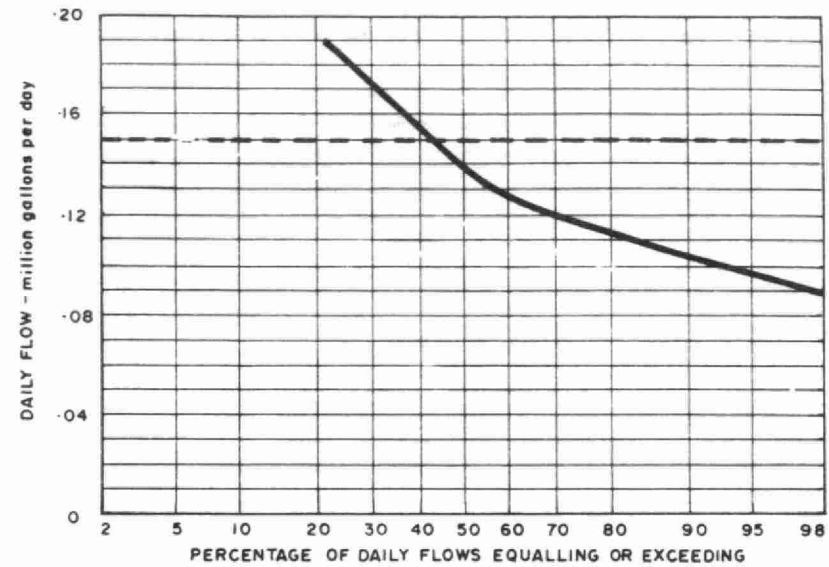
YEARLY OPERATING COSTS

YEAR	WATER TREATED in million gallons	TOTAL OPERATING COSTS	UNIT COSTS
			cents /1000 gal.
1974	55.2	22,559	41

OPERATING EXPENDITURES

Regular Staff	\$ 1,119	\$
Casual (Unclassified) Staff		
TOTAL SALARIES AND WAGES		1,119
TOTAL EMPLOYEE BENEFITS		36
TOTAL TRANSPORTATION AND COMMUNICATIONS		1,361
Insurance	481	
Sludge Haulage	-	
Repairs and Maintenance	-	
Other Services	-	
TOTAL SERVICES		481
Machinery and Equipment	147	
Chemicals	8,048	
Utilities	7,389	
Other Supplies and Equipment	3,978	
TOTAL SUPPLIES AND EQUIPMENT		19,562
TOTAL AQUISITION/CONSTRUCTION OF PHYSICAL ASSETS		-
TOTAL TRANSFER PAYMENTS		-
OTHER TRANSACTIONS		-
GRAND TOTAL	GRAND TOTAL	\$ 22,559

PROCESS DATA FLOWS

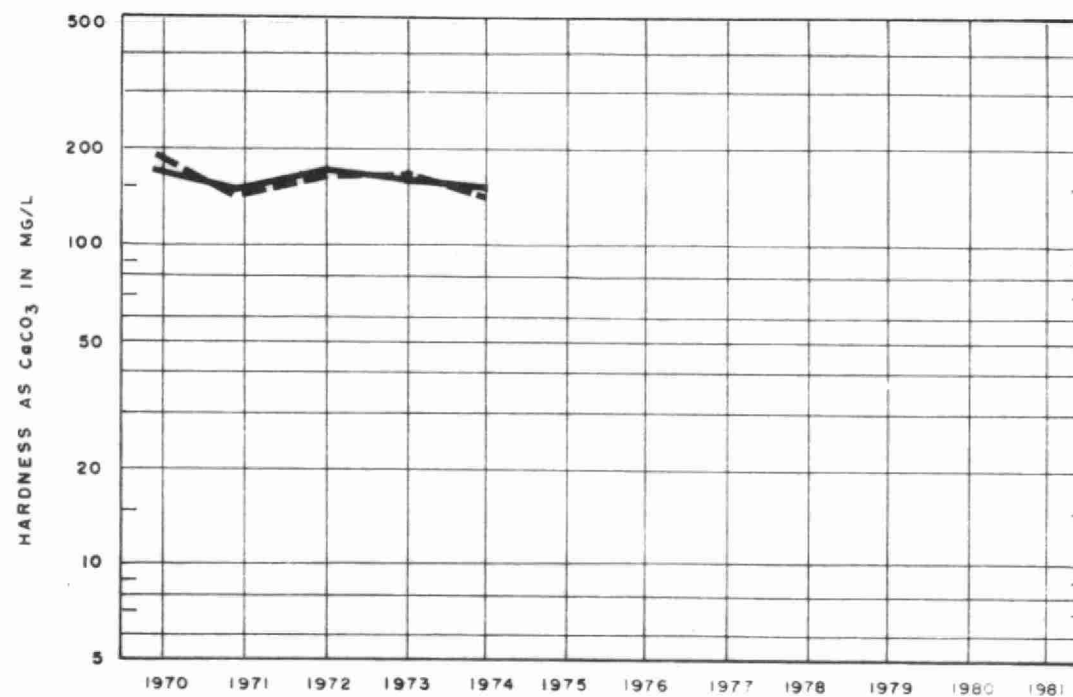
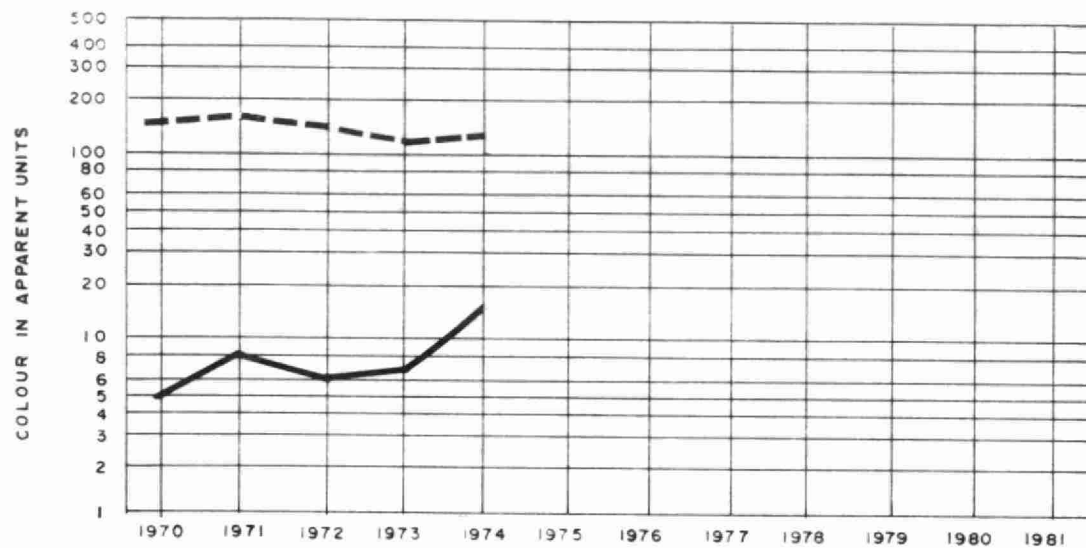


DESIGN CAPACITY — — — — —

PLANT PERFORMANCE

MONTH	FLOWS				RAW WATER		TREATED WATER					
	TOTAL PLANT OUTPUT million gallons	AVERAGE DAILY FLOW million gallons	MAXIMUM DAY'S FLOW million gallons	MAXIMUM RATE mgd	TURBIDITY (AVERAGE) FTU	COLOUR (AVERAGE) App. units	TURBIDITY		COLOUR		TEMPERATURE	
							AVERAGE FTU	MAXIMUM FTU	AVERAGE App. units	MAXIMUM App. units	AVERAGE ° F	MAXIMUM ° F
JAN	4.68	.157	.176		2.6	80	.9	.9	8	15	34	34
FEB	4.75	.169	.195		3.2	50	1.6	1.6	11	15	34	34
MAR	6.73	.217	.286			40			40	40	34	34
APR	7.61	.254	.316			40	3.5	3.5	41	60	33	33
MAY	6.57	.212	.261		3.7	85	7.2	7.2	50	90	36	41
JUNE	4.44	.148	.168			175			12	60	47	55
JULY	3.52	.113	.154		36.3	188	1.6	2.2	7	30	58	60
AUG	3.19	.103	.145		3.2	219	5.3	9.0	8	60	56	59
SEPT	3.24	.108	.132		5.1	200	1.3	1.9	6	30	46	52
OCT	3.40	.110	.150		1.5	160	4.7	4.7	5	20	33	38
NOV	3.28	.109	.134		1.6	145	2.1	2.1	5	15	33	34
DEC	3.82	.123	.153		3.8	129	3.8	3.8	6	40	33	33
TOTAL	55.23											
AVG.		.151	MAXIMUM .316	MAXIMUM	7.9	126	4.8	MAXIMUM 9.0	17	MAXIMUM 90	40	MAXIMUM 60

WATER QUALITY



PLANT INFLUENT - - - - -

PLANT EFFLUENT —————

CHLORINATION and DISINFECTION

MONTH	RAW WATER					PLANT EFFLUENT		DISTRIBUTION SYSTEM		CHLORINATION			
	NUMBER OF SAMPLES HAVING TOTAL COLIFORM ORGANISMS PER 100 ml OF					NUMBER OF SAMPLES TAKEN	NUMBER HAVING COLIFORM ORGANISMS	NUMBER OF SAMPLES TAKEN	NUMBER HAVING COLIFORM ORGANISMS	TOTAL AMOUNT OF NaOCl gallons	DOSAGE		RESIDUAL IN PLANT EFFLUENT mg/l
	0	1 - 3	4 - 32	33 - 320	> 320						PRE - mg/l	POST - mg/l	
JAN		1	1			2				105		2.7	.5
FEB			2			2				85		2.1	.5
MAR			2			2		2		125		2.2	.6
APR		1				1		2		150		2.4	.6
MAY	1		1	1		5		3		300		5.4	.6
JUNE		1	1			2		4		190		5.1	.6
JULY	1		2			2				165		5.6	.6
AUG			1	1				4	1	130		4.0	.5
SEPT	1			1		2		6		130		4.8	.5
OCT			2			2		8		100		3.5	.8
NOV			2			2	1	4		90		3.2	.6
DEC	1	1		3		3				90		2.3	.5
TOTAL	4	4	14	6		25	1	33	1	1660			
AVG.	8									5		3.6	.6

TREATMENT DATA

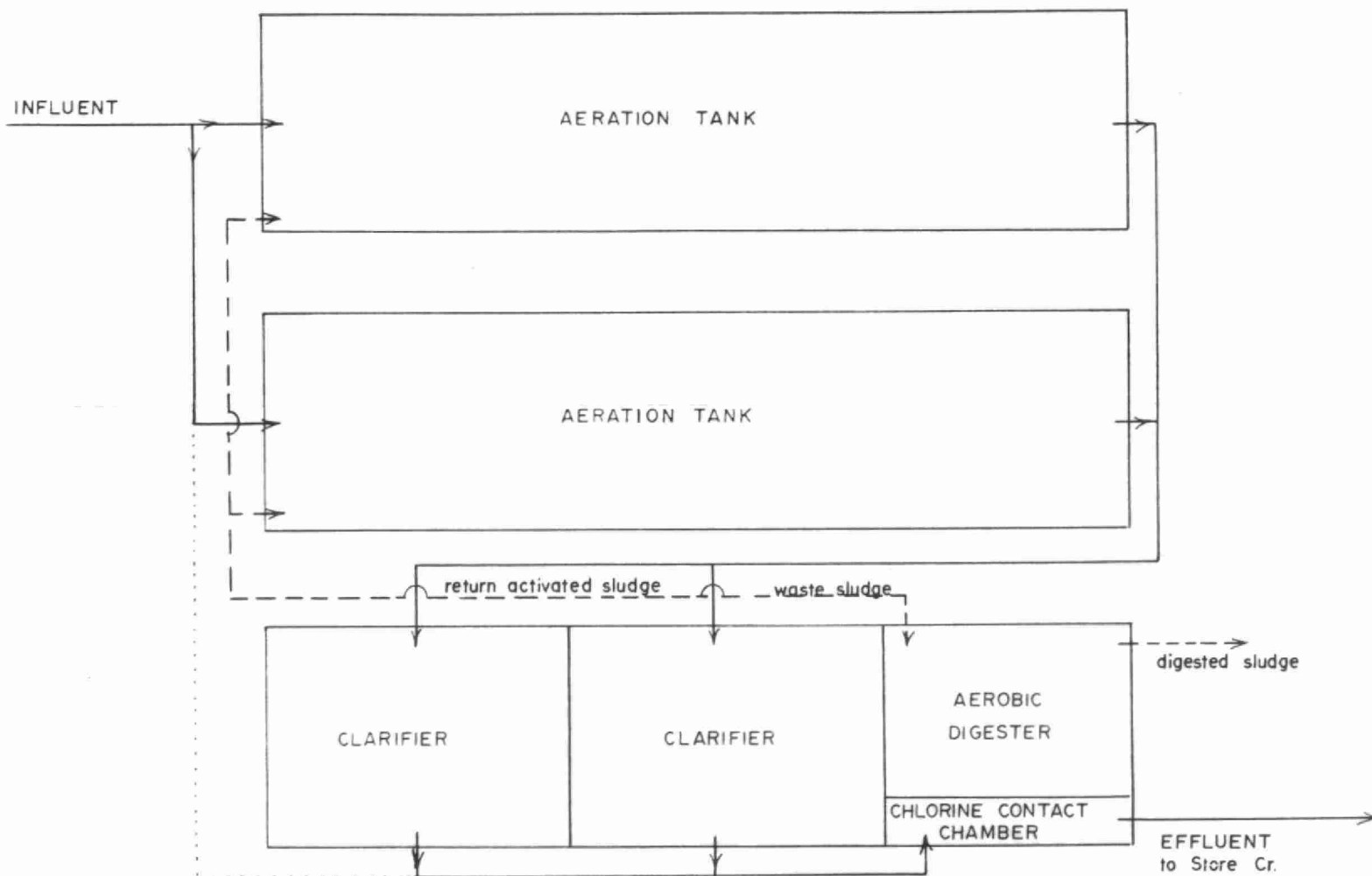
MONTH	CHEMICALS USED										FILTER OPn	
	A L U M		SEPARAN		SODA ASH		FLUOSILICIC ACID		A - 22		AVERAGE RUN hours	BACKWASH WATER mil. gal
	AMT. USED pounds	DOSE mg/l	AMT. USED pounds	DOSE mg/l	AMT. USED pounds	DOSE mg/l	AMT. USED gallons	DOSE mg/l	AMT. USED pounds	DOSE mg/l		
JAN	3500	74.9	48	1.0	2000	42.8	14.6	1.1			20	.050
FEB	2800	58.9	38	.8	1700	35.8	12.8	.9			20	.448
MAR	400	46.1	4	.5	200	23.0	28.1	1.4			20	.006
APR							32.9	1.5				
MAY	1700	47.2	18	.5	1100	47.0	31.9	1.7			16	.050
JUNE	3600	81.1	33	.7	3000	67.6	26.6	2.1			16	.048
JULY	3600	102.4	84	2.3	3100	88.2	26.5	2.6			16	.050
AUG	3700	116.0	78	2.4	3100	97.1	24.3	2.7			16	.050
SEPT	3400	104.8	56	1.7	2100	64.7	20.9	2.3			16	.048
OCT	3900	114.5	49	1.4	2400	70.5	22.2	2.3			16	.050
NOV	3500	106.6	35	1.1	2800	85.3	22.4	2.4			16	.048
DEC	3900	102.2	29	1.3	1700	44.5	24.5	2.2	18.0	1.0	16	.050
TOTAL	34000		472		23200		287.7		18.0			.898
AVG.		80.4		1.1		53.3		1.8		1.0	17	.075

WATER QUALITY

PROPERTY	RAW WATER				TREATED WATER				DESIRABLE STANDARDS
	NUMBER OF SAMPLES	AVERAGE	MAXIMUM	MINIMUM	NUMBER OF SAMPLES	AVERAGE	MAXIMUM	MINIMUM	
HARDNESS in mg/l as CaCO_3	14	138	360	30	15	142	348	30	80 - 100
ALKALINITY in mg/l as CaCO_3	14	120	312	25	15	150	319	8	30 - 100
IRON in mg/l Fe	14	1.14	6.4	.5	14	.15	.35	.05	Less than 0.3
CHLORIDE in mg/l Cl^-	10	114	341	5	10	117	334	10	Less than 250
pH in pH units	14	7.6	8.4	6.8	14	7.8	9.6	6.3	7.0 - 8.5
FLUORIDE in mg/l F^-	11	.19	.6	.05	377	1.0	1.3	.3	Less than 1.2

— WATER POLLUTION CONTROL PLANT —

MOOSONEE WATER POLLUTION CONTROL PLANT



DESIGN DATA

PROJECT NO. 1-0002-66
PROJECT NAME Moosonee WPCP
TREATMENT Extended Aeration

DESIGN FLOW 75,000 l. gal/day

DESIGN POPULATION 1,000

BOD - Raw Sewage 254 mg/l
- Removal 90%

SS - Raw Sewage 286 mg/l
- Removal 85%

PRELIMINARY TREATMENT

Comminution

Type: Chicago Pump Model 7B

EXTENDED AERATION

Aeration Tanks

Type: Diffused air, single pass
Size: Two 45.6' x 11' x 12'
(12,000 ft³ or 75,000 gal)
Retention: 24 hours

Air Supply

Type: Hoffman
Size: Two 312 cfm

Diffusers

Type: Shearusers
Spacing: 22/tank @24" centres

Sedimentation

Type: Smith & Loveless
Size: Two (18,400 gal)
Retention: 5.9 hours
Loading: Surface, 204 gal/ft²/day
Weirs, 2250 gal/ft/day

CHLORINATION

One W & T V-800 400'b/day

Chlorine Contact Chamber

Size: 2430 gal
Retention: 48 minutes

SLUDGE HANDLING

Digestion System - Aerobic

Size: 1140 ft³ or 7100 gal
Air Supply: 50 cfm
Diffusers: 7 Shearusers

OUTFALL

To Store Creek (at junction of
Moose River)

'74 Review

GENERAL

The project consists of a secondary sewage treatment plant and three pumping stations. The plant is a prefabricated field erected unit designed to utilize either the contact stabilization process or the extended aeration process. The plant has a capacity of 75,000 gallons per day using the extended aeration process and a capacity 112,500 gallons per day using the contact stabilization process. It is presently operated as an extended aeration plant. The plant is totally enclosed in an insulated metal building. The treated effluent is discharged to Store Creek.

The project is operated by a Chief Operator and an operator who divide their duties between the sewage treatment plant and the water treatment plant.

There were no major mechanical or process problems during the year.

EXPENDITURES

The total operating cost for the year was \$31,430 which represents an increase of 18 percent over the previous year.

The average cost per million gallons of sewage treated was \$796 which is 47 percent less than the cost for 1973. The average cost per pound of BOD removed was 51 cents.

PLANT FLOWS AND CHLORINATION

The average daily flow for the year was 110,000 gallons, which represents an increase of 62,000 gallons per day over the previous year. This extraordinary increase is attributed to a flowmetering problem which was discovered and corrected in March of the year. It had long been suspected that previous flows were in error.

If the average daily flow continues to exceed the extended aeration design capacity, it will be necessary to convert the plant process to contact stabilization in 1975.

The final effluent was chlorinated from June 1 to November 30 and a total of 470 gallons of sodium hypochlorite solution was used providing an average chlorine dosage of 2.5 mg/l.

PLANT EFFICIENCY

The average raw sewage BOD and suspended solids concentrations were 176 mg/l and 249 mg/l respectively. The raw sewage BOD strength was 60 percent more than in 1973 and the suspended solids concentration was 5 percent more.

The average BOD and suspended solids concentrations in the treated effluent were 21 mg/l and 22 mg/l respectively which represent average BOD and suspended solids reductions of 88 percent and 91 percent respectively. The BOD and suspended solids reductions were the same in 1973.

AERATION

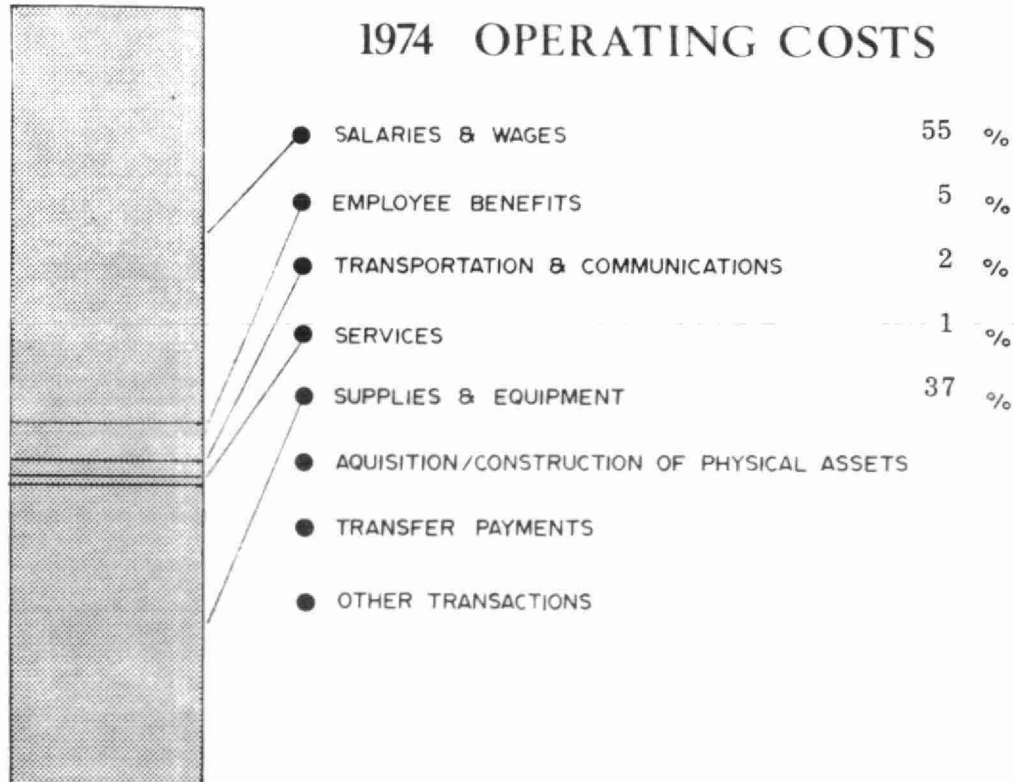
The average MLSS concentration of 3,500 mg/l and F/M ratio of 0.08 were within the acceptable limits for good operation of the aeration facilities.

CONCLUSIONS

The general operation of the plant was satisfactory and the final effluent quality has deteriorated slightly from the previous year because the average daily flow has exceeded the design flow using the extended aeration process. Therefore, the plant will be changed over to the contact stabilization process in 1975 if flows continue to be high.

ANNUAL COSTS

1974 OPERATING COSTS



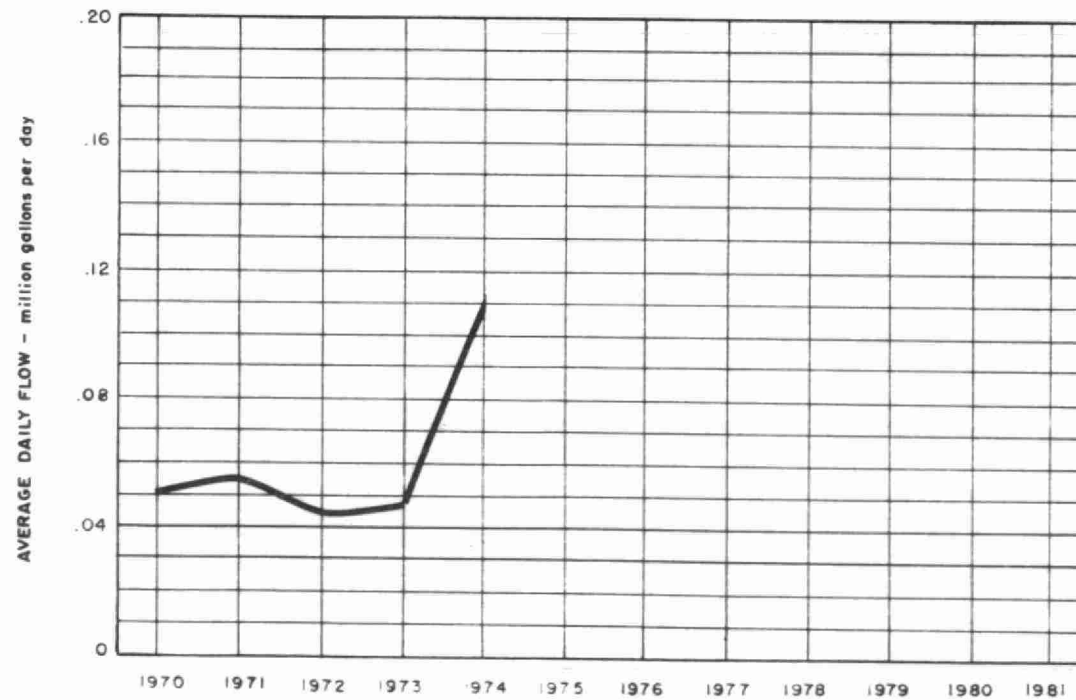
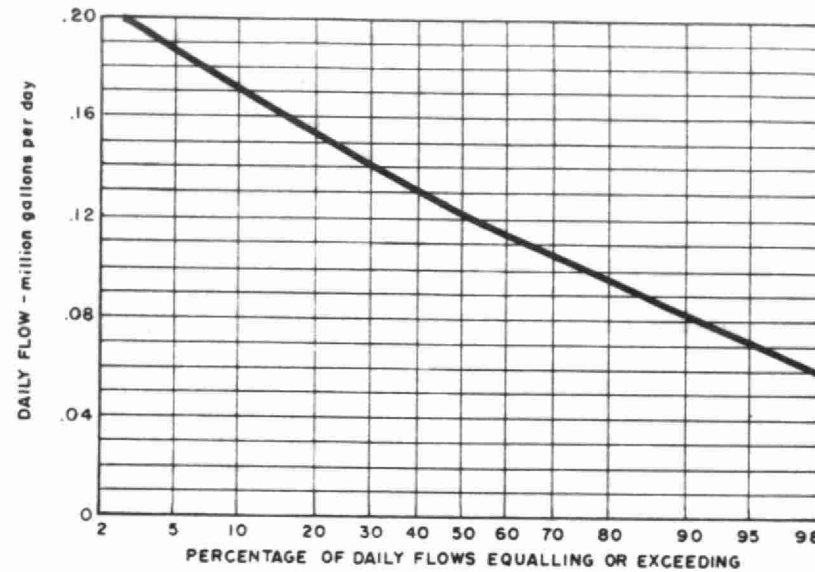
YEARLY OPERATING COSTS

YEAR	SEWAGE TREATED in million gallons	TOTAL OPERATING COSTS	UNIT COSTS	
			\$/M.G	¢/lb BOD
1974	39.5	43,777	1,108	72

OPERATING EXPENDITURES

Regular Staff	\$ 24,001	\$
Casual (Unclassified) Staff	-	
TOTAL SALARIES AND WAGES		24,001
TOTAL EMPLOYEE BENEFITS		2,310
TOTAL TRANSPORTATION AND COMMUNICATIONS		899
Insurance	496	
Sludge Haulage	-	
Repairs and Maintenance	43	
Other Services	35	
TOTAL SERVICES		574
Machinery and Equipment	479	
Chemicals	1,585	
Utilities	12,201	
Other Supplies and Equipment	1,728	
TOTAL SUPPLIES AND EQUIPMENT		15,993
TOTAL AQUISITION/CONSTRUCTION OF PHYSICAL ASSETS		
TOTAL TRANSFER PAYMENTS		
OTHER TRANSACTIONS		
GRAND TOTAL	GRAND TOTAL	\$ 43,777

PROCESS DATA FLOWS

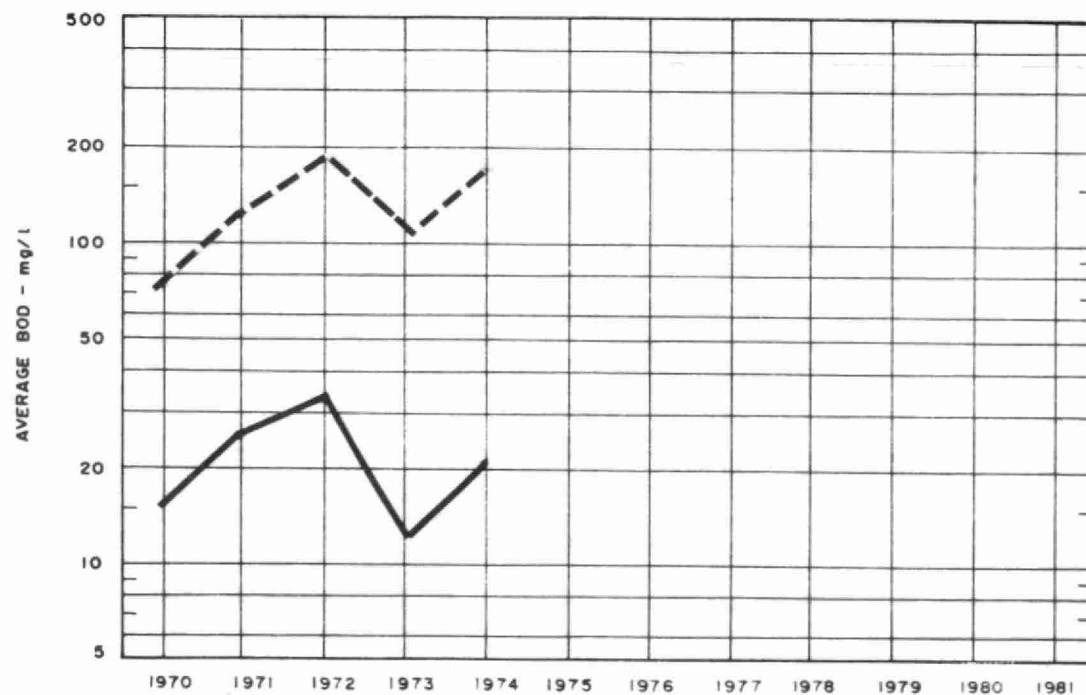
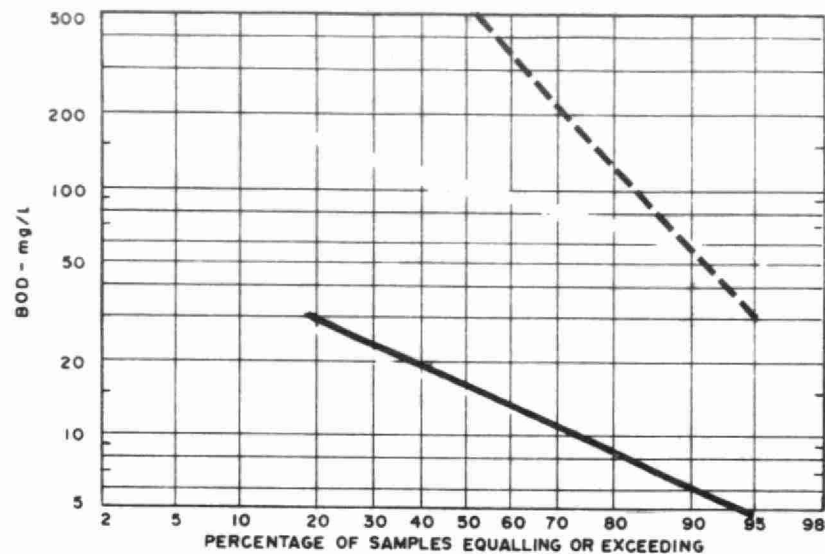


DESIGN CAPACITY — — — — —

PLANT PERFORMANCE

MONTH	FLOWS			BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				PHOSPHORUS	
	TOTAL FLOW	AVERAGE DAY	MAXIMUM DAY	INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT
	million gallons	mil. gal	mgd	mg/l	mg/l	%	10 ³ pounds	mg/l	mg/l	%	10 ³ pounds	mg/l P	mg/l P
JAN	1.8	.059	.079	131	11	92	2.2	163	15	91	2.7	6.1	1.4
FEB	1.5	.054	.069	225	37	84	2.9	120	15	88	1.6	5.5	1.5
MAR	3.1	.099	.29	490	20	96	14.6	284	20	93	8.2	7.3	1.8
APR	5.4	.18	.30	78	19	76	3.2	93	15	84	4.2	4.8	1.3
MAY	5.6	.18	.27	75	15	80	3.4	305	18	94	16.1	4.3	1.3
JUNE	3.7	.12	.19	130	5	96	4.6	290	15	95	10.2	5.0	1.3
JULY	3.0	.10	.20	115	24	79	2.7	170	28	84	4.2	5.8	.7
AUG	3.1	.10	.13	253	39	85	6.6	580	18	97	17.4	11.0	1.7
SEPT	3.2	.11	.24	144	24	83	3.8	375	40	89	10.7	6.4	3.0
OCT	3.4	.11	.19										
NOV	3.1	.10	.11	85	15	82	2.2	120	30	75	2.8	5.4	2.9
DEC	2.6	.09	.10	140	10	93	3.4	180	24	87	4.0	5.9	2.3
TOTAL	39.5	-	-	-	-	-		-	-	-		-	-
AVG.	3.3	.11	MAXIMUM .30	176	21	88	5.1	249	22	91	7.5	6.3	2.0
No. of Samples	-	-	-	20	20	-	-	20	20	-	-	20	20

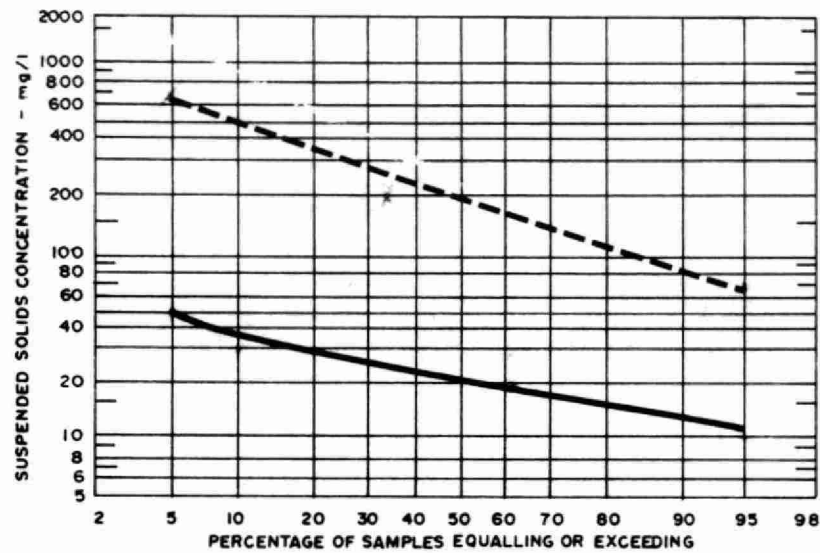
BIOCHEMICAL OXYGEN DEMAND



PLANT INFLUENT - - - - -

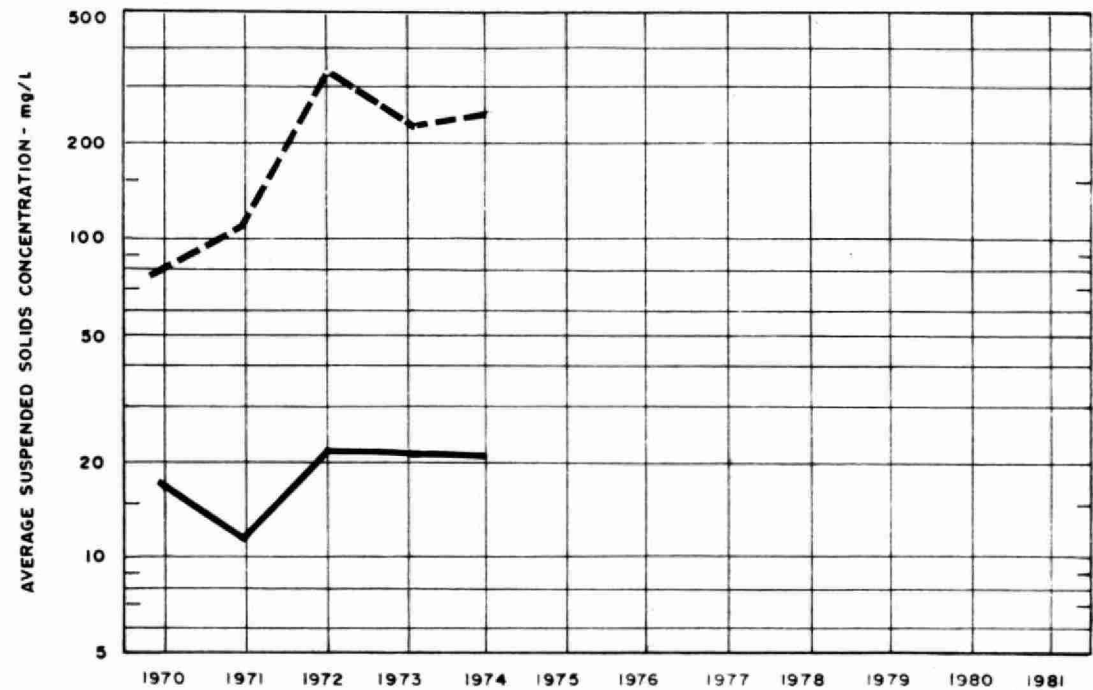
PLANT EFFLUENT —————

SUSPENDED SOLIDS

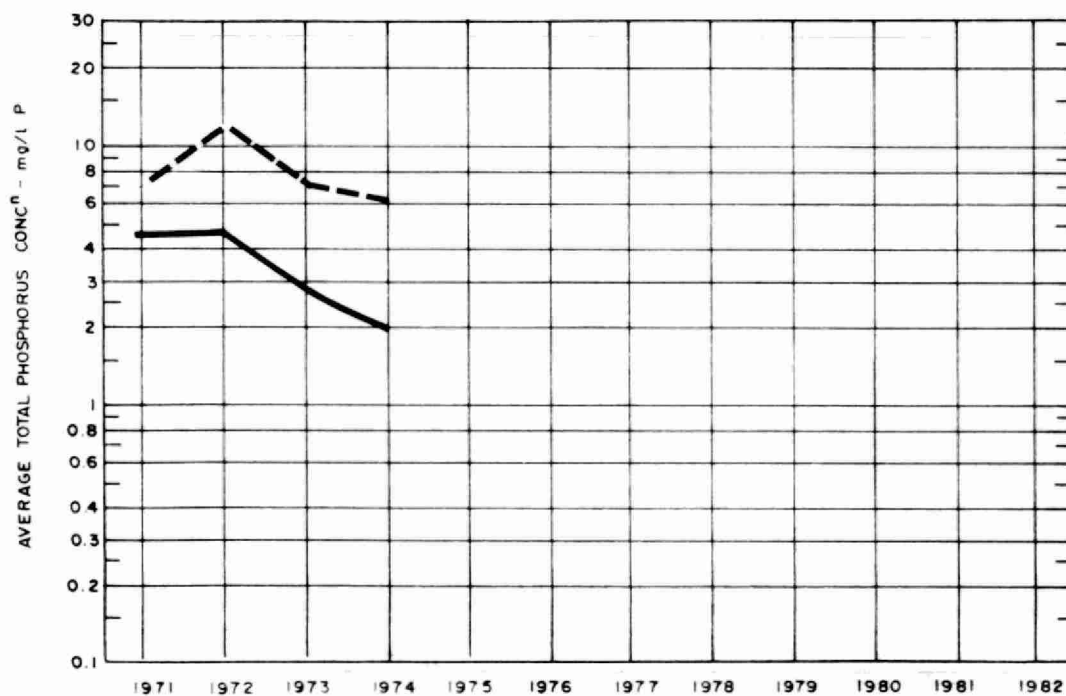
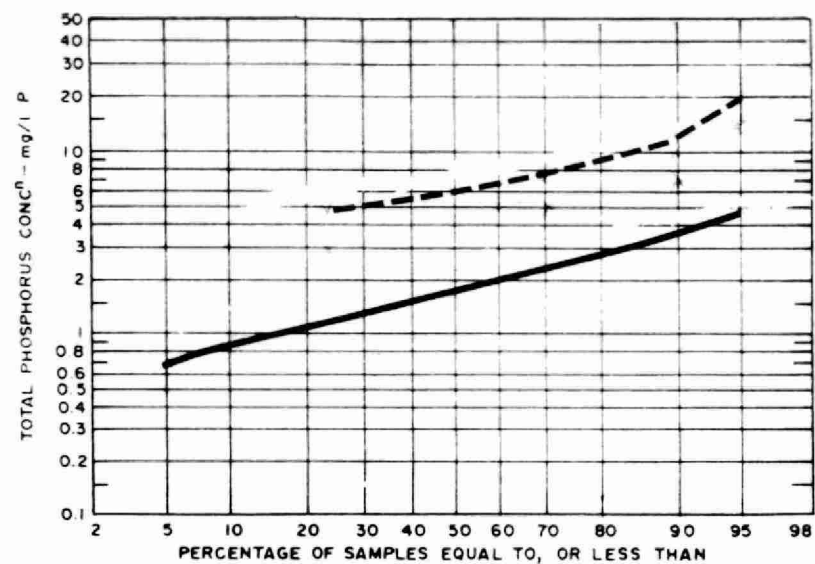


PLANT INFLUENT - - - - -

PLANT EFFLUENT _____



PHOSPHORUS



PLANT INFLUENT - - - - -

PLANT EFFLUENT —————

TREATMENT DATA

MONTH	GRIT	CHLORINATION		AERATION			WASTE SLUDGE			AEROBIC DIGESTER			
	QUANTITY REMOVED cubic feet	NaOCl gallons	AVG. DOSAGE mg/l	MLSS CONC mg/l	F/M day ⁻¹	AIR USED $\frac{1000 \text{ ft}^3}{\text{lb BOD}}$	QUANTITY 10^3 gallons	SUSPENDED SOLIDS mg/l	VOL. SOLIDS %	QUANTITY REMOVED 10^3 gallons	SUSPENDED SOLIDS mg/l	VOL SOLIDS %	AMOUNT HAULED cubic yards
JAN				3000	.03	3.6		6300	63				
FEB				2300	.07	2.5		4800	62				
MAR				2100	.31	.6		4700	62				
APR				2200	.09	2.4		6500	54				
MAY				3700	.05	2.4		6900	45				
JUNE		95	3.1	4400	.05	1.7		7100	54				
JULY		80	3.2	4100	.04	2.9		7500	50				
AUG		80	3.1	3400	.10	1.2		7300	50				
SEPT		75	2.8	4700	.04	2.0		8200	51				
OCT.		65	2.3										
NOV		75	2.9	2900	.04	3.7		6600	56				
DEC				5200	.03	2.2		12000	52				
TOTAL		470	—	—	—	—		—	—		—	—	
AVG.	cu. ft/mil gal	78	2.5	3500	.08	2.3		7100	54				

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